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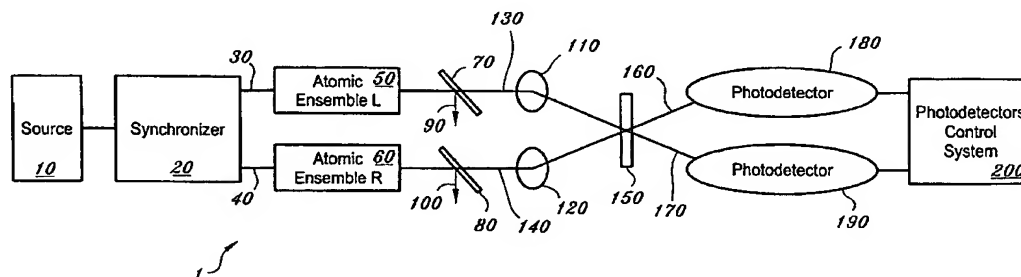
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(54) Title: LONG-DISTANCE QUANTUM COMMUNICATION



(57) **Abstract:** The invention provides systems and methods enabling high fidelity quantum communication over long communication channels even in the presence of significant loss in the channels comprising laser manipulation of quantum correlated atomic ensembles using linear optic components (110, 120), optical sources of low intensity pulses (10), beam splitters (150), single-photon detectors (180, 190) requiring only moderate efficiencies. The invention provides fault-tolerant entanglement generation, connection, using a sequence of steps that each provide built-in entanglement purification and are each resilient to the realistic noise. The invention relies upon collective rather single particle excitations in atomic ensembles and result in communication efficiency scaling polynomially with the total length of a communication channel.